



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/731,399

12/10/2003

Andrei S. Dukhin

4523

7590
Dr. Andrei S. Dukhin
12 Branch Street
Goldens Bridge, NY 10526

07/13/2007

EXAMINER

OLSEN, KAJ K

ART UNIT

PAPER NUMBER

1753

MAIL DATE

DELIVERY MODE

07/13/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/731,399	Applicant(s) DUKHIN ET AL.	
	Examiner Kaj K. Olsen	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>12-10-2003</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Information Disclosure Statement

1. The citation of the "Kopf-Sill" patent has been crossed off because the number given for the patent is incorrect. Presumably, the applicant meant USP 6,616,823 and the examiner has cited that appropriate patent on the enclosed PTO-892.
2. The examiner has crossed off three of the listed non-patent literature citations because copies of these articles were not present in the application file. If applicant wishes to have these references considered, then applicant should submit the references and list them on an additional IDS form.

Specification

3. The disclosure is objected to because of the following informalities: Applicant uses the term "obstacles" at various places throughout the specification (see p. 1, paragraph 1; the paragraph bridging pp. 6 and 7; and the last two paragraphs of p. 10). As discussed in the 112 rejection of claim 5 below, the examiner believes this term should be --objects-- or --particles--.
4. On page 2, second line from the bottom, applicant refers to "Kopf-Sill" by the incorrect patent number (see discussion of the IDS above). Applicant should correct the listed patent number.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

Art Unit: 1753

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7. Claim 5 sets forth an "array of metal obstacles". Applicant never disclosed an array of metal obstacles in the specification and hence one possessing ordinary skill in the art would not be enabled for the incorporation of metal obstacles into the device of the instant invention.

Although applicant referred to the presence of "obstacles" at various places in the specification, it would appear to the examiner that this term was simply a typo for --objects--. See p. 7, ll. 3 and 4 where applicant appears to be specifying properties of the particles (or objects) and not some obstacles *per se*. See also the last two paragraphs of p. 10, where applicant uses the term "electroosmosis generating obstacles" whereas applicant clearly meant --electroosmosis generating objects-- as claim 3 evidences. Moreover, even if the examiner were to interpret the "obstacles" of claim 5 as being a typo for "object", applicant still wouldn't have support for an array of objects

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 1753

10. Claim 1 is confusing because it is inconsistent in its use of terminology. In particular, the claims states that it is a method for directing motion of “liquid”, then states that a field is applied to “the system of material objects” for inducing electroosmotic flow on the “object-liquid interfaces”. The examiner first notes that there is no antecedent basis for either “the system of material objects” nor “the object-liquid interfaces”. Moreover, the examiner is confused as to what is the relationship between these various terms. Are the “material objects” components within the liquid? Isn’t the electric field applied to the whole “liquid” and not just the “system of material objects”? Moreover, the examiner is confused about what the object-liquid interfaces are. It is the examiner’s understanding that electroosmotic flow is a bulk flow process in that when electroosmotic flow is generated, it is generated through the entire fluid (in contrast to electrophoresis or dielectrophoresis where objects in the fluid move relative to the liquid media). See Manz et al (J. Micromech. Microeng. 4 (1994), pp. 257-265), sections 1.5 and 1.6. This discussion of Manz would appear to be in agreement with the applicant on p. 7, ll. 15-19 where applicant states that electroosmosis differs from electrophoresis in that the particles do not move relative to the liquid, but that the liquid moves relative to the electrodes. In view of this understanding, it is unclear to the examiner what the applicant means by “object-liquid interfaces”. This term doesn’t appear anywhere in the specification and appears to contradict both the applicant’s and common understanding of electroosmosis.

11. In claim 1, the use of the term “with arbitrary symmetry” is confusing and would appear to be unnecessary. If applicant doesn’t want to be bound to any particular symmetry for the system of material objects, then applicant need not say anything about the symmetry.

Art Unit: 1753

12. In claims 3-5, the terms “electroosmosis generating objects” or “system of electroosmosis generating objects” lack antecedent basis. Moreover, in claims 4 and 5, the “system of electroosmosis generating objects” should be a --system for generating electroosmosis-- as the applicant’s term appears to refer to the objects themselves and not the system for moving the objects.

13. In claims 4 and 5, “is microfluidics device” is grammatically awkward and should be --is a microfluidic device--.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 1, 2, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by McBride (USP 5,964,997).

16. With respect to the claims as best understood (see 112 rejection above), McBride discloses a method of generating directed motion of a liquid by electroosmosis by applying an unbalanced AC electric field that has a zero time averaged component for inducing electroosmotic flow on the liquid. See col. 6, l. 63 through col. 7, l. 4, col. 7, l. 37 through col. 8, l. 45, and fig. 1. With respect to the presence of a finite time average of higher powers of electric field strength, the instant invention evidences that the AC field patterns disclosed by McBride in

Art Unit: 1753

fig. 1 would inherently possess a finite time average when integrated over the electric field cubed. See p. 8 and example two of fig. 1 of the instant invention.

17. With respect to the claimed frequencies, McBride teaches the use of frequency ranges that overlap the presumed frequency ranges of the claims. In particular, McBride teaches a preferred use of frequencies between 100 and 10 kHz (see claim 12) and this range includes frequencies greater than the Warburg frequency, but less than the hydrodynamic relaxation frequency. See the last paragraph of p. 10 of the specification.

18. With respect to a microfluidic device with an array of electrodes, see col. 10, ll. 1-34.

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over McBride in view of Demers et al (USP 6,033,544).

21. McBride set forth all the limitations of the claim, but did not explicitly recite the use of electroosmosis generating objects (i.e. electrodes) having either cylindrical or spherical symmetry and a size not exceeding 10 microns. However, McBride did explicitly refer to the use of the teaching of application 08/744,386 (col. 10, ll. 1-6), which became the patent of Demers. Demers teaches the use of electrodes having cylindrical symmetry (wires are cylindrical) and teaches that the electrodes protrude into the fluid with as little as 5 microns of depth. See col. 15,

Art Unit: 1753

11. 1-10. The examiner is construing claim 3 as requiring only one single dimension of the electrode have a size not exceeding 10 microns, which Demers teaches. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Demers for the method of McBride because McBride explicitly suggested doing so.

22. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over McBride in view of Squires et al (USP 7,081,189).

23. McBride set forth all the limitations of the claim, but did not explicitly recite the presence of an array of metal obstacles. Squires teaches that an array of metal obstacles can be utilized to enhance the electroosmotic flow for the system. See col. 5, ll. 10-36; col. 7, ll. 25-40; and col. 8, ll. 36-49. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Squires for the method of McBride so as to enhance the electroosmotic flow of fluid through the system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaj Olsen whose telephone number is (571) 272-1344. The examiner can normally be reached on Monday through Friday from 8:00 A.M. to 4:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

Art Unit: 1753

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

AU 1753

July 6, 2007



KAJ K. OLSEN
PRIMARY EXAMINER